Where STEM learning and Earth science data services meet

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STEM learning is most effective when students are encouraged to see the connections between science, technology and real world problems. Helping to make these connections has become an increasingly important aspect of Earth science data research. The Global Hydrology Resource Center (GHRC), one of NASA's 12 EOSDIS data centers, has developed a new type of documentation called the micro article to facilitate making connections between data and Earth science research problems.

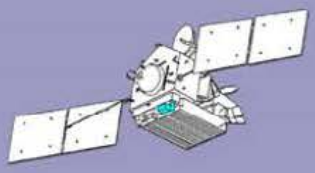
Micro articles are short academic texts that enable a reader to quickly understand a scientific phenomenon, a case study, or an instrument used to collect data. While originally designed to increase data discovery and usability, micro articles also serve as a reliable starting point for project-based learning, an educational approach in STEM education, for high school and higher education environments. This presentation will highlight micro articles at the Global Hydrology Resource Center data center and will demonstrate the potential applications of micro articles in project-based learning.

What are Micro Articles?

Micro articles were originally defined in a conference paper by Tero et al and were described as 'academic texts which are longer than a normal abstract but may be one tenth the size of a normal journal article.' Tero et al meant for micro articles to bridge gaps in the scientific research process that are not typically documented, published or shared.

To suit our needs, we have defined the micro article as a short, interesting document that brings together data and key science concepts. These documents are curated by both Earth and data scientists to ensure the accuracy and trustworthiness of the provided information.

Weather Events



Earth Observing Instruments

Phenomena

Research Publications using GHRC Data

Event Micro Article

- The 'Event' micro article is especially helpful for STEM education for high school and higher education students
- 'Event' micro article explains an event and describes the science behind that event. Very similar to a case study.
- Case studies are especially useful to Earth science students who are learning to work with data in order to understand a scientific problem.
- The 'event' micro article provides links to data that has already been pre-packaged to the correct spatial and temporal period for the identified event. Relevant parameters have also already been identified and culled out of the data.
- Pre-packaged data is great because:
  - In a classroom setting, it minimizes processing time and leaves more time for the instructor to focus on teaching students how to use software, tools and the science behind the event.
  - It helps students who may not be able to pre-process the data still have the experience of working with data.
- The 'event' micro article also provides a link to an iPython notebook that can programmatically subset the data. This gives the student or instructor the option of learning how to use a tool to subset the data instead of downloading it in a pre-packaged form.
- Links are provided in the micro article to the original data in case the student wishes to learn more about the datasets or if they wish to download more data.

Summary

- Micro articles help all types of users to quickly discover and use Earth science data.
- Micro articles, especially the 'Event' micro article type, are especially beneficial to Earth science instructors and students because they cohesively bring together key science concepts, data and programming tools.
- These micro articles are helpful for project-based STEM learning because a scientific hypothesis or problem is already identified. A student can use identified data and technology to solve the problem.

https://ghrc.nsstc.nasa.gov/home/micro-articles

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GHRC Global Hydrology Resource Center